

Citation:

Niemeier HM, Raynor HA, Lloyd-Richardson EE, Rogers ML, Wing RR. Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *J Adolesc Health*. 2006 Dec;39(6):842-9. Epub 2006 Sep 27.

PubMed ID: [17116514](#)

Study Design:

Prospective cohort study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To longitudinally examine the relationship between fast food and breakfast consumption during adolescence and early adulthood on BMI status in early adulthood using nationally representative data from the National Longitudinal Study of Adolescent Health (Add Health).

Inclusion Criteria:

- Student in grades seven through 12
- Residing in United States
- Informed consent

Exclusion Criteria:

- Seriously disabled participants
- Pregnant females
- Not residing in United States
- Students not in grades seven through 12.

Description of Study Protocol:**Recruitment:**

- School-based study
- Not discussed in detail as additional details published elsewhere

Design:

- Longitudinal study with measurement conducted for same subjects in both adolescence and

young adulthood

- Used data from weighted in-home samples collected at wave II (April 1996-August 1996) and wave III (August 2001-April 2002) of the Add Health study
- Height and weight as well as fast food and breakfast consumption was measured at both waves of the study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis:

- Bivariate analyses to examine differences in proportions among categorical variables used chi square tests
- Student's t tests used for determining differences between groups for continuous variables
- Multivariate regression used to examine relationship between Wave II fast food consumption and change in fast food consumption between Wave II and Wave III and zBMI at Wave III
- Multivariate regression analyses conducted to examine relationship between Wave II breakfast consumption and change in breakfast consumption between Wave II and Wave III and zBMI at Wave III
- Analyses controlled for Wave II zBMI, race/ethnicity, gender, age, month of interview, maternal obesity, parental education, physical activity, sedentary behavior and change in sedentary behavior from Wave II to Wave III.

Data Collection Summary:

Timing of Measurements

- Anthropometrics
 - Height and weight measured at both waves for 95% of participants during in-home surveys
 - Subjects refusing measurements or with body weights exceeding the scale capacity provided self-reported height and weight
 - BMI and BMI z scores (zBMI) scores calculated at both waves
 - zBMI scores derived using 2000 Centers for Disease Control and Prevention growth charts
- Dietary behaviors
 - Fast food consumption measured at both waves by single item asking "In the last seven days, on how many days did you eat at a fast food type place- McDonalds, Kentucky Fried Chicken, Pizza Hut, Taco Bell, etc?"
 - Breakfast consumption was assessed at both waves by a single item asking "In the last seven days, on how many days did you eat breakfast?"
- Active and sedentary behaviors
 - Measured for both waves of the study
 - Seven day recall used to assess frequency of participation in three categories of activities including skating and bicycling, active sports and exercise
 - Sedentary behavior assessed by summing up number of hours in the previous week spent watching television or videos

Dependent Variables

- Body mass index

Independent Variables

- Fast food consumption
- Breakfast consumption

Control Variables

- Active behavior
- Sedentary behavior
- Ethnicity
- Month of interview
- Maternal obesity
- Parental education
- Household income

Description of Actual Data Sample:

Initial N: Data drawn from Add Health study with over 20,000 adolescents, used data from 9,919 subjects with gender breakdown not discussed

Attrition (final N): 9919 subjects

Age:

- Wave II: 15.9±0.11 years
- Wave III: 21.3±0.11 years

Ethnicity:

- 66.1% white
- 15% African American
- 11.9% Hispanic
- 4.1% Asian
- 2.1% Native American
- 0.9% other
- Racial distribution for overweight participants differed significantly from that of normal weight participants as African American subjects were more likely to be classified as overweight ($\chi^2(5)=38.48$, $p<0.0001$)

Other relevant demographics:

- Parental education differed by overweight status [$\chi^2(4)=30.82$, $p<0.0001$] with normal weight participants more likely to have at least one parent graduate from college

Anthropometrics:

- Baseline BMI: 22.9±0.12 kg/m²
- BMI for participants classified at overweight for Wave II: 29.1±0.16 kg/m² ($p<0.0001$)
- BMI for participants classified at normal weight for Wave II: 20.4±0.06 kg/m²

Location: School-based study in the United States.

Summary of Results:

Key Findings

- Body Mass Index (BMI)
 - BMI increased from an average of $22.9 \pm 0.12 \text{ kg/m}^2$ at Wave II to an average of $26.1 \pm 0.13 \text{ kg/m}^2$ at Wave III
 - 28.7% of adolescents were classified as overweight at Wave II while 47% of young adults were classified as overweight at Wave III
- Dietary Behaviors: Fast food consumption
 - Wave II adolescents reported consuming fast food on 2.15 ± 0.5 days during the previous week while Wave III young adults consumed fast food on 2.48 ± 0.05 days
 - Fast food consumption significantly increased between Wave II and Wave III in the total sample ($t=5.50, p<0.001$)
 - Adolescents self-identifying as "other" racial group reported consuming fast food on significantly fewer ($p<0.05$) days in the past week, 1.68 ± 0.16 days, than white adolescents (2.15 ± 0.06 days)
 - Fast food consumption significantly increased between Wave II and Wave III in the total sample as well as within white ($t=5.50, p<0.0001$), African American ($t=7.48, p<0.0001$) and Hispanic ($t=4.51, p<0.0001$) participants
 - African American young adults consumed fast food on significantly more days than white young adults ($p<0.0001$)
- Dietary Behaviors: Breakfast consumption
 - Breakfast was eaten on 4.34 ± 0.06 days during Wave II and 3.09 ± 0.05 days during Wave III, representing a significant decrease between Wave II and Wave III in the total sample ($p<0.0001$) and among all racial/ethnic groups ($p<0.05$)
 - At Wave II, African American and Native American adolescents ate breakfast on significantly fewer days during the past week than whites ($p<0.01$)
 - At Wave III, African American and Asian American young adults reported consuming breakfast on significantly fewer days during the past week ($p<0.05$)
- Relationship between dietary behaviors at Wave II and BMI status at Wave III
 - Fast food consumption at Wave II predicted zBMI at Wave III after controlling for zBMI, activity and demographic covariates at Wave II ($p<0.05$)
 - A greater number of days of fast food consumption in the past week during adolescence was associated with increased relative body weight during adulthood
 - Change in fast food consumption between Wave II and Wave III did not significantly predict zBMI at Wave III ($p>0.05$)
 - Breakfast consumption at Wave II predicted zBMI at Wave III after controlling for zBMI at Wave II and other covariates ($p<0.05$)
 - Negative relationship suggests that fewer days during the previous week in which breakfast was consumed at Wave II predicted increased zBMI at Wave III
 - Both Wave II breakfast consumption and change in breakfast consumption independently significantly predicted Wave III zBMI ($B = -0.2, p<0.01$; $B = -0.01, p<0.01$ respectively)

Variables	Wave II	Wave III	Statistical Significance of Group Difference
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BMI (kg/m ²)	22.9±0.12	26.1±0.13	p<0.0001
Fast food consumption (days per week)	2.15±0.05	2.48±0.05	p<0.0001
Breakfast consumption (days per week)	4.34±0.06	3.09±0.05	p<0.0001

Other Findings

- Parental education distribution differed by overweight status ($\chi^2(4)=30.82$, $p<0.0001$)
- Normal weight participants were more likely to have at least once parent graduate from college.

Author Conclusion:

The study is the first to show increases in fast food consumption and breakfast skipping during the transition from adolescence to adulthood. Greater fast food consumption and breakfast skipping during adolescence and increases in breakfast skipping from adolescence to early adulthood were associated with increased weight gain during this transition. The magnitude of the relationships between fast food consumption and breakfast skipping and body weight in this study was relatively small. However, these behaviors could be easily assessed and targeted in primary care settings and therefore may provide a useful tool in the prevention of weight gain during adolescence.

Reviewer Comments:

- *Question if a single question asking about consumption over the past seven days is adequate enough to evaluate average and typical consumption*
- *Activity and sedentary behaviors as well as fast food and breakfast consumption were self-reported.*
- *Self-reported weights were used when participants refused measurements; this substitution was done for 105 participants at Wave II and 421 participants at Wave III, as well as 49 participants whose weight exceeded the scale capacity*
- *Assessment of fast food and breakfast consumption was limited to two items; detailed dietary measures, such as overall energy intake, percent energy from fat, or specific foods eaten at breakfast or from fast food restaurants were not obtained in this investigation*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1. Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)

Yes

2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	Were study groups comparable?	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	No
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	???
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes

9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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